

We claim:

1           1.     A dispenser for consumable liquids comprising:

- 2                   (a)     a compartment for receiving a flexible, at least partially collapsible  
3 container of consumable liquid, in a container receiving location therein,  
4                   (b)     a compressed gas activated pressure applicator secured at a location  
5 contiguous to the container receiving location and adapted to apply container-collapsing pressure  
6 to the container in the container receiving location,  
7                   (c)     a liquid dispensing location,  
8                   (d)     a consumable liquid flow channel defining a liquid flow path  
9 communicating between the container receiving location and the liquid dispensing location,  
10                  (e)     a consumable liquid control valve operatively connected to open and close  
11 the flow path and control the dispensing of consumable liquid at the liquid dispensing location.

1           2.     The dispenser according to claim 1, wherein the compressed gas activated  
2 pressure applicator comprises

- 3                   (i)     an expansible bladder confined in the compartment at the location  
4 contiguous to the container location, and  
5                   (ii)    a compressed gas line communicating between the interior of the  
6 expansible bladder and a source of compressed gas.

1           3.     The dispenser according to claim 2, wherein, in operation, the expansible bladder  
2 is secured in pressure exerting relation to the flexible consumable liquid container, urging  
3 collapse of the container, whereby activation of the valve to open the flow path results in  
4 dispensing flow of consumable liquid at the liquid dispensing location.

1           4.     The dispenser according to claim 1, wherein the liquid dispensing location is  
2 above a counter, and the compartment is located below the counter.

1           5.     The dispenser according to claim 3, wherein the liquid dispensing location is  
2 above a counter, and the compartment is located below the counter.

1           6       The dispenser according to claim 4, further comprising an upstanding stem on  
2 the counter and a dispensing head supported above the counter by the stem at the dispensing  
3 location, the flow channel passing from the compartment through the counter, and through the  
4 upstanding stem to the dispensing head.

1           7.       The dispenser according to claim 6, further comprising valve activating means at  
2 the dispensing head.

1           8.       The dispenser according to claim 7, wherein, in operation, the flow channel  
2 receives along its length a flexible liquid delivery tube communicating between the interior of  
3 the flexible liquid container, through the channel to the dispensing head.

1           9.       The dispenser according to claim 8, wherein the valve is a normally closed pinch  
2 valve engaging the flexible liquid delivery tube.

1           10.      The dispenser according to claim 9, wherein the pinch valve is electrically  
2 activated.

1           11.      The dispenser according to claim 4, wherein the compartment is within a cabinet  
2 below the counter.

1           12.      The dispenser according to claim 11, wherein the counter comprises a top, outer  
2 wall of the cabinet.

1           13.      The dispenser according to claim 11, wherein the dispenser is movable, the  
2 cabinet being mounted on means facilitating the movement of the cabinet.

1           14.      The dispenser according to claim 1, further comprising a refrigeration unit in  
2 cooling relation to the compartment location containing the liquid container.

1           15.      The dispenser according to claim 14, further comprising an air movement path  
2 extending from the cabinet compartment location into and along the flow channel to cool liquid  
3 in the consumable liquid flow channel.

1           16.     The dispenser according to claim 4, further comprising a refrigeration unit below  
2 the counter in cooling relation to the compartment location containing the liquid container.

1           17.     The dispenser according to claim 16, further comprising an air movement path  
2 extending upward through the counter along the flow channel to cool liquid in the consumable  
3 liquid flow channel.

1           18.     The dispenser according to claim 1, wherein the compartment comprises a  
2 drawer, the drawer confining the container receiving location and the pressure applicator.

1           19.     The dispenser according to claim 16, further comprising at least one safety  
2 interlock switch connected in controlling relation to a gas release path connected with the  
3 pressure activator to release compressed gas therefrom and relieve pressure therein to prevent  
4 potentially injurious expansion of the activator under pressure.

1           20.     The dispenser according to claim 19, wherein the safety interlock switch is a  
2 position detecting switch mounted proximate a doorway giving access to the compartment and  
3 activated by opening the door in the doorway.

1           21.     The dispenser according to claim 11, further comprising at least one safety  
2 interlock switch responsive to opening of the cabinet and in controlling relation to a gas release  
3 path connected with the pressure activator to release compressed gas therefrom and relieve  
4 pressure therein to prevent potentially injurious expansion of the activator under pressure upon  
5 opening of the compartment.

1           22.     The dispenser according to claim 11, wherein the compartment comprises a  
2 drawer within the cabinet.

1           23.     The dispenser according to claim 1, wherein the compartment for receiving a  
2 flexible, at least partially collapsible container comprises one of a plurality of such compartments  
3 containing flexible liquid supply containers and pressure activators, the containers  
4 communicating through the flow channel to the dispensing location.

1           24.    The dispenser according to claim 22, wherein a plurality of flexible liquid  
2   delivery tubes communicate between the interior of the flexible liquid containers through the  
3   channel to the dispensing location.

1           25.    The dispenser according to claim 24, wherein the consumable liquid control is  
2   one of a plurality of liquid control valves, each operatively connected in flow control relation to  
3   one of the liquid delivery tubes.

1           26.    The dispenser according to claim 1, wherein the liquid control valve comprises a  
2   dose regulating valve.

1           27.    The dispenser according to claim 26, the dose regulating valve comprising a slide  
2   slidably received in a housing, a biasing element urging the slide away from a dispensing  
3   position to a home position in the housing at which the slide defines, with the housing, a  
4   chamber, a liquid inlet opening into the chamber through the housing, connected, in use, to the  
5   container of consumable liquid via the flow channel, a liquid dispensing opening in the housing  
6   closed by the slide when the slide is in the home position, and a liquid path formed in a portion  
7   of the slide, the liquid path extending from an opening into the chamber to an opening movable  
8   into alignment with the liquid dispensing opening when the slide is moved against the force of  
9   the biasing element to the dispensing position.

1           28.    The dispenser according to claim 27, wherein the liquid inlet opening of the dose  
2   dispensing valve is located to be blocked by the slide as the slide is moved against the force of  
3   the biasing element to the dispensing position and the valve further comprising an air escape  
4   passage opening from the chamber to atmosphere affording air escape from the chamber as the  
5   chamber fills with liquid and air introduction into the chamber when liquid is dispensed from the  
6   chamber and the slide moves back toward its home position.

1           29.    A dispenser for consumable liquids comprising:

2                   (a)     a temperature controlled enclosure,

3                   (b)     a store for consumable liquid in the enclosure,

4                   (c)     a delivery system for moving the consumable liquid along a path to a  
5   dispensing location remote from the enclosure, and

6                   (d)     an air mover located to move temperature-controlled air from the  
7   enclosure along the path to control the temperature along the path.

1           30.    The dispenser according to claim 29, wherein the temperature controlled  
2   enclosure is a refrigerated enclosure.

1           31.    The dispenser according to claim 30, wherein the dispenser is a dispenser of dairy  
2   product, and the refrigerated chamber and air mover maintains the dairy product at a temperature  
3   below approximately 41 degrees Fahrenheit in the store and along the entire path to the  
4   dispensing location.

1           32.    The dispenser according to claim 30, wherein the dispenser is a dispenser of dairy  
2   product, the path of the delivery system comprises a conduit for passage of a flexible dairy  
3   product delivery tube to a dispensing head.

1           33.    The dispenser according to claim 32, wherein the dispensing head is formed of  
2   insulating material.

1           34.    The dispenser according to claim 33, further comprising temperature indicating  
2   means carried on the dispensing head for indicating temperature within the dispensing head.

1           35.    The dispenser according to claim 32, wherein the dispensing head includes a  
2   pinch valve normally pinching the dairy product delivery tube closed proximate an end of the  
3   tube at the dispensing head.

1           36.    The dispenser according to claim 35, wherein the air mover directs refrigerated air  
2   along the dairy product delivery tube in the conduit to the delivery head and proximate the end of  
3   the dairy product delivery tube.

1           37.     The dispenser according to claim 36, wherein the conduit includes a return path of  
2     air flow opening into the enclosure for returning air to the chamber from the dispensing head.

1           38.     The dispenser according to claim 37, wherein the air mover comprises a fan  
2     located to move refrigerated air out of the enclosure into and along the conduit to the delivery  
3     head and back along the return path to the enclosure.

1           39.     The dispenser according to claim 29, wherein the dispensing location is at a  
2     location above the store for consumable liquid, the store comprises a location in the enclosure for  
3     receiving a flexible, collapsible bag of the consumable liquid, the delivery system including a  
4     pressure applicator in pressure transmitting relation to the flexible, collapsible bag when in use,  
5     and a consumable liquid delivery tube in liquid delivery relation between the bag and the  
6     dispensing location.

1           40.     The dispenser according to claim 39, wherein the enclosure is a movable unit  
2     having an upper member defining a counter, the dispensing head being supported on the counter  
3     and the conduit extending into an opening through the counter.

1           41.     The dispenser according to claim 40, wherein the flexible collapsible bag is one of  
2     a plurality of flexible collapsible bags for containing a variety of liquid products, the pressure  
3     applicator is one of a plurality of pressure applicators, each pressure applicator being in pressure  
4     transmitting relation to one of the flexible, collapsible bags, the consumable liquid delivery tube  
5     being one of a plurality of consumable liquid delivery tubes passing from the bags through the  
6     conduit to the dispensing head, the valve being one of a plurality of valves controlling flow of  
7     liquid from the tubes.

1           42.    A liquid dispenser comprising:

2                   (a)    a source of compressed air,

3                   (b)    means for receiving a collapsible container of liquid,

4                   (c)    means communicating between the means for receiving the collapsible  
5 container and a liquid dispensing location,

6                   (d)    an inflatable air bag,

7                   (e)    means for confining the inflatable air bag proximate the collapsible  
8 container location in force exerting relation to a collapsible container when located there, and

9                   (f)    means connecting the source of compressed air to the air bag to inflate the  
10 bag thereby causing the liquid to be expelled from the container.

1           43.    The liquid dispenser according to claim 42, wherein the means communicating  
2 between the means for receiving a collapsible container and the liquid dispensing location  
3 comprises a valve in liquid flow controlling relation thereto.

1           44.    The liquid dispenser according to claim 43, further comprising temperature  
2 control means for controlling the temperature of liquid in the collapsible container.

1           45.    The liquid dispenser according to claim 44, wherein the temperature control  
2 means is a refrigeration unit.

1           46.    The liquid dispenser according to claim 42, further comprising a liquid level  
2 sensor including at least one magnetic element secured to the inflatable bag and a magnetic  
3 sensing device supported to sense movement of the magnetic element into proximity with the  
4 sensing device as the inflatable bag expands against a collapsing container as liquid is dispensed.

1           47.    The liquid dispenser according to claim 46, wherein the magnetic sensing device  
2 is supported at a location proximate the location to which the magnetic element moves when the  
3 collapsible container is substantially empty and fully collapsed.

1           48.    The liquid dispenser according to claim 47, further comprising a further magnetic  
2 sensing device supported at a location to which the magnetic element moves when the container  
3 is partially empty and is partially collapsed.

1           49.     The liquid dispenser according to any one of claims 46 - 48, wherein each  
2 magnetic sensing device is a Hall switch.

1           50.     The liquid dispenser according to any one of claims 46 - 48, wherein each  
2 magnetic sensing device is connected in controlling relation to a liquid level indicator.

1           51.     The liquid dispenser according to claim 42 wherein, other than the collapsible  
2 container, the liquid being dispensed is free of contact with any moving part impelling the liquid  
3 to the dispensing location.

1           52.     The liquid dispenser according to claim 42, wherein the means communicating  
2 between the means for receiving the collapsible container and the liquid dispensing location  
3 includes a fitment for connection to the collapsible bag at an opening into the bag through which  
4 liquid is expelled, the fitment including means extending through the opening into the interior of  
5 the bag to prevent collapse of a bag wall onto the opening in liquid flow blocking relation to the  
6 opening.

1           53.     The liquid dispenser according to claim 52, wherein the means extending through  
2 the opening into the interior of the bag includes a series of spaced prongs extending into the  
3 interior of the bag and between which liquid can flow to the exterior of the bag.

1           54.     A method of consumable liquid dispensing comprising the steps of:  
2                 (a)     confining a collapsible container of a consumable liquid at a first location,  
3                 (b)     providing a gas pressure activated force applicator in force applying  
4 relation to the collapsible container,  
5                 (c)     providing a liquid flow path communicating between the interior of the  
6 collapsible container and a remote liquid dispensing location, and  
7                 (d)     applying an activating gas pressure to the force applicator to urge collapse  
8 of the container forcing liquid flow to the liquid dispensing location.

1           55.     The method of consumable liquid dispensing according to claim 54, wherein the  
2 step of providing a liquid flow path comprises providing a flexible tube extending between the  
3 collapsible container and the dispensing location.



1           56.    The method of consumable liquid dispensing according to claim 54, wherein  
2    providing a gas pressure activated force applicator comprises providing a compressed gas  
3    activated force applicator, and the step of applying an activating gas pressure comprises  
4    providing a source of compressed gas in communication with the activator.

1           57.    The method of consumable liquid dispensing according to claim 56, wherein  
2    providing a compressed gas activated gas applicator comprises providing an expansible gas bag  
3    in force applying relation to the collapsible container, and the step of applying an activating gas  
4    pressure comprises applying compressed gas from the source of compressed gas to the interior of  
5    the gas bag to urge collapse of the container.

1           58.    The method of consumable liquid dispensing according to claim 56, further  
2    comprising providing a pinch valve at the dispensing location normally pinching closed the  
3    flexible tube.

1           59.    The method of consumable liquid dispensing according to claim 56, further  
2    comprising refrigerating the collapsible container.

1           60.    A dose regulating dispensing valve including:  
2                (a)    a slide slidably received in a housing;  
3                (b)    a biasing element urging the slide away from a dispensing position to a  
4    home position in the housing at which position a chamber is formed by the housing and the slide,  
5                (c)    a liquid inlet opening into the chamber through the housing, connected, in  
6    use, to a supply of liquid to be dispensed in doses,  
7                (d)    a liquid dispensing opening in the housing closed by the slide when the  
8    slide is in the home position, and  
9                (e)    a liquid path formed in a portion of the slide, the liquid path extending  
10   from an opening out of the chamber through the slide to an opening movable into alignment with  
11   the liquid dispensing opening when the slide is moved against the force of the biasing element to  
12   the dispensing position.

1           61.    The dose regulating dispensing valve according to claim 60, wherein the liquid  
2 inlet opening is located to be blocked by the slide as the slide is moved against the force of the  
3 spring to the dispensing position.

4           62.    The dose regulating dispensing valve according to claim 61, further comprising an  
5 air escape passage opening from the chamber to atmosphere affording air escape from the  
6 chamber as the chamber fills with liquid, and air introduction into the chamber as a liquid is  
7 dispensed from the chamber.

1           63.    The dose regulating dispensing valve according to claim 62, wherein the air  
2 escape passage is a passage formed between the housing and the slide from the chamber to an  
3 end of the housing from which the slide extends.

1           64.    The dose regulating dispensing valve according to claim 61, wherein the liquid  
2 path in a portion of the slide extends from an inner end of the slide along the slide and laterally  
3 of the slide to the opening movable into alignment with the liquid dispensing opening, which  
4 opening movable into alignment is located at a lateral boundary of the slide intermediate the  
5 slide inner end a further end thereof.

1           65.    The dose regulating dispensing valve according to claim 60, wherein the biasing  
2 element is a spring connected in force exerting relation between the housing and the slide.

1           66.    A fitment for use in connecting a collapsible consumable liquid container to a  
2 flexible liquid delivery tube in a consumable liquid dispensing installation, comprising an outer  
3 connector portion sized and configured to connect the fitment to a part of the collapsible  
4 consumable liquid container at an outlet opening on the container, a hollow tube connecting end  
5 for attaching to the liquid delivery tube, an opening through the fitment to the interior of the  
6 hollow liquid delivery tube for the passage of liquid from the container interior to the liquid  
7 delivery tube and at least one projection of a length to extend into the interior of the container at  
8 the opening therein to block a wall of the container collapsing into opening-blocking relation to  
9 the opening and preventing substantially complete emptying of the container through the opening  
10 and the fitment.

1        67.     A fitment according to claim 66, wherein the at least one projection defines at  
2     least one liquid flow location past the projection into the opening through the fitment.

1        68.     A fitment according to claim 67, wherein the at least one projection includes a  
2     plurality of spaced apart projections of a length to extend into the interior of a container and the  
3     at least one liquid flow location comprises spaces between the plurality of spaced projections.